1. A compression member for an electrochemical cell stack, comprising:

a first surface including a plurality of raised portions, said plurality of raised portions being aligned to define a plurality of receiving areas, said plurality of raised portions and said plurality of receiving areas being configured such application of an axial compressive force spreads said plurality of raised portions into said plurality of receiving areas;

a second surface including a substantially flat surface; and

an edge defined by said first surface and said second surface, said edge including a portion being configured to receive an electrochemical cell terminal therethrough, the compression member being formed of electrically non-conductive materials.

2. The compression member of claim 1, wherein said axial compressive force is in a range from about 50 psi to about 2500 psi.

3. The compression member of claim 2, wherein said axial compressive force is in a range from about 375 psi to about 500 psi.

4. The compression member of claim 1, wherein said portion is an opening being configured to receive said electrochemical cell terminal therethrough.

5. The compression member of claim 1, wherein said electrically non-conductive material is a moldable elastomeric material.

6. The compression member of claim 5, wherein said moldable elastomeric material is selected from the group consisting of silicone rubber, fluoroelastomers, terpolymers of ethylene and propylene, and blends or mixtures thereof.

7. An electrically conductive bus plate for an electrochemical cell stack, comprising:

a substantially planar portion defining an edge; and

a terminal portion extending from said edge, said terminal portion including a first portion and a second portion, said first portion being substantially perpendicular to said substantially planar portion, said second portion being angled with respect to said first portion toward said substantially planar portion.

8. The electrically conductive bus plate of claim 7, wherein said second portion is angled about 3° with respect to said first portion.

9. The electrically conductive bus plate of claim 8, wherein said second portion has spring characteristics for retaining a plurality of sub-assembly components.

10. The electrically conductive bus plate of claim 9, further comprising:

an insulator being adapted to receive said terminal portion such that at least said second portion extends from said insulator, said insulator being dimensioned and configured to mate with corresponding openings in endplates of the electrochemical cell stack.

11. The electrically conductive bus plate of claim 10, wherein said insulator is a molded component having a slot, said slot being adapted to receive said terminal portion such that at least said second portion extends from said insulator.

12. An electrochemical cell stack, comprising:

a first endplate, said first endplate comprising one fluid passage for a water feed, one fluid passage for an oxygen output, and one fluid passage for a hydrogen output;

a second endplate;

an electrochemical cell disposed between a first separator and a second separator, said electrochemical cell including a first electrode in electrical communication with said first separator, a second electrode in electrical communication with said second separator, and a membrane layer between said first electrode and said second electrode, said first electrode being in fluid communication with said fluid passage for said water feed and said one fluid passage for said oxygen output, and said second electrode being in fluid communication with said one fluid passage for said hydrogen output;

a first conductor being accessible through said first endplate, said first conductor being in electrical communication with said first separator; and

a second conductor being accessible through said second endplate, said second conductor being in electrical communication with said second separator.

13. The electrochemical cell stack of claim 12, further comprising:

a first non-conductive compression member and a second non-conductive compression member, said first non-conductive compression member being disposed between said first separator and said first endplate, and said second non-conductive compression member being disposed between said second separator and said second endplate.

14. The electrochemical cell stack of claim 13, further comprising:

a first shim and a second shim, said first shim between said first separator and said first endplate and said second shim between said second separator and said second endplate, said first shim and said second shim each configured with an opening such that said first and second non-conductive compression members and said first and second conductors fit within said openings.

15. The electrochemical cell stack of claim 14, wherein said first shim comprises a first, second, and third boss configured to fit within said first, second, and third fluid passages.

16. An electrochemical cell stack comprising:

a first endplate;

a second endplate;

an electrochemical cell disposed between a first separator and a second separator, said electrochemical cell including a first electrode in electrical communication with said first separator, a second electrode in electrical communication with said second separator, and a membrane layer between said first electrode and said second electrode; and

a first non-conductive compression member being disposed between said first separator and said first endplate, said first electrode being accessible through said first non-conductive compression member and said first endplate; and

a second non-conductive compression member being disposed between said second separator and said second endplate, said second electrode being accessible through said second non-conductive compression member and said second endplate.

17. The electrochemical cell stack of claim 16, wherein said first non-conductive compression member and said second non-conductive compression member are formed from a material selected from the group consisting of silicone rubber, fluoroelastomers, terpolymers of ethylene and propylene, and blends or mixtures thereof.

18. The electrochemical cell stack of claim 16, wherein said first non-conductive compression member and said second non-conductive compression member each comprise:

a first surface being proximate said first endplate or second endplate, respectively, said first surface including a plurality of raised portions, said plurality of raised portions being aligned to define a plurality of receiving areas, said plurality of raised portions and said plurality of receiving areas being configured such application of an axial compressive force spreads said plurality of raised portions into said plurality of receiving areas;

a second surface being proximate said first or second separator, said second surface including a substantially flat surface.

19. The electrochemical cell stack of claim 18, wherein said axial compressive force is from about 50 psi to about 2500 psi.

20. The electrochemical cell stack of claim 16, further comprising:

a first bus plate and a second bus plate, said first bus plate being in intimate contact with said first separator and said first non-conductive compression member, said second bus plate being in intimate contact with said second separator and said second non-conductive compression member, a terminal portion of said first bus plate being accessible through said first non-conductive compression member and said first endplate and a terminal portion of said second bus plate being accessible through said second non-conductive compression member and said second endplate.

21. The electrochemical cell stack of claim 20, wherein said first bus plate and said second bus plate each comprise:

a substantially planar portion defining an edge; and

said terminal portion extending from said edge, said terminal portion including a first portion and a second portion, said first portion being substantially perpendicular to said substantially planar portion, said second portion being angled with respect to said first portion toward said substantially planar portion.

22. The electrochemical cell stack of claim 21, further comprising

an insulator being adapted to receive said terminal portion such that at least said second portion extends from said insulator, said insulator being dimensioned and configured to mate with corresponding openings in said first and said second endplates, respectively.

23. The electrochemical cell stack of claim 22, wherein said insulator is a molded component having a slot, said slot being adapted to receive said terminal portion such that at least said second portion extends from said insulator.

24. A frame member for an electrochemical cell stack, comprising:

an outer periphery;

an inner periphery;

a surface defined between said outer periphery and said inner periphery;

a fluid port defined axially through said surface, said fluid port having a length along said inner and said outer peripheries;

a plurality of fluid manifolds defined in said surface, each of said plurality of fluid manifolds defining a fluid flow channel between said fluid port and said inner periphery, and at least one of said plurality of fluid manifolds extending along said inner periphery a distance beyond said length of said fluid port.

25. The frame member of claim 24, further comprising:

a gap defined in said inner periphery, said gap being radially offset along said inner periphery in a first direction from said fluid port, said gap being in fluid communication with said inner periphery, said at least one of said plurality of fluid manifolds defining a fluid flow channel between said fluid port and said gap.

26. The frame member of claim 25, wherein said gap extends along said inner periphery a substantial distance beyond said length of said fluid port.

27. The frame member of claim 25, further comprising:

a second gap defined in said inner periphery, said second gap being radially offset along said inner periphery in a second direction from said fluid port, said second direction

being opposite said first direction, said second gap being in fluid communication with said inner periphery, a different one of said plurality of fluid manifolds defining a fluid flow channel between said fluid port and said second gap.

28. The frame member of claim 25, wherein said plurality of fluid manifolds and said gap enhance fluid distribution across a flow field defined within said inner periphery.

29. The frame member of claim 24, further comprising:

a protector lip provided at said inner periphery, said protector lip being adapted to prevent a flow field of the electrochemical cell stack from extruding into said plurality of fluid manifolds.

30. The frame member of claim 29, wherein said protector lip is integral with the frame member.

31. A frame member for an electrochemical cell stack, comprising:

an outer periphery;

an inner periphery;

a surface defined between said outer periphery and said inner periphery;

a fluid port defined axially through said surface, said fluid port having a length along said inner and said outer peripheries;

a plurality of fluid manifolds defined in said surface, each of said plurality of fluid manifolds defining a fluid flow channel between said fluid port and said inner periphery, and

at least one of said plurality of fluid manifolds extending along said inner periphery a distance beyond said length of said fluid port; and

a gap disposed in said inner periphery, said gap extending about said inner periphery and being radially offset along said inner periphery in a first direction from said fluid port, said at least one of said plurality of fluid manifolds defining a fluid flow channel between said fluid port and said channel.

32. The frame member of claim 31 wherein said gap extends along said inner periphery a substantial distance beyond said length of said fluid port.

33. In a hydrogen generating system including a water source, an electrochemical cell stack, an electrical source, a high-pressure separator, a low-pressure separator, a dryer, a controller, and a ventilation system, wherein the improvement comprises:

a first flow field within said electrochemical cell stack between a first electrode and a separator, said first flow field being surrounded in the radial direction by a first frame, and a second flow field between a second electrode and a separator surrounded in the radial direction by a second frame, a boundary defined between an inside edge of said first frame and an outside edge of said flow field, wherein said boundary is configured with gaps in fluid communication with one or more manifolds.